When Does Institutional Investor Activism Pay?: The Carbon Disclosure Project*

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Abstract

This paper presents the first empirical test of the effect of institutional investor activism towards climate change. Specifically, we study the conditions under which FT 500 companies' participation in the Carbon Disclosure Project (CDP), a consortium of institutional investors with $57 trillion in assets, created shareholder value, using the event study methodology. By making use of Russia's ratification of the Kyoto Protocol, which caused the Protocol to go into effect, we find that companies' CDP participation paid when the likelihood of climate change regulation rose. We conservatively estimate the total value created at $2.7 billion, about 27% of the size of the carbon market in 2005. Our findings suggest that institutional investor activism towards climate change can increase shareholder value when the external business environment becomes more climate conscious.

Keywords: institutional investor activism, Kyoto Protocol, Carbon Disclosure Project

JEL No.

D21 – Firm Behavior;
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1. Introduction

The Carbon Disclosure Project (CDP) is a consortium of over 300 institutional investors with over $57 trillion in assets in 2008, including Barclays Group, California Public Employees' Retirement System (CalPERS), Goldman Sachs, Merrill Lynch, Morgan Stanley, and UBS, among others. Since 2002, the CDP has asked the world's 500 largest companies every year to disclose their greenhouse gas (GHG) emissions, risks, opportunities, and management strategies. Some companies participate in the CDP, while others do not. The CDP publicly discloses company responses on its website, presumably in the hope that publicized information will affect investment behavior.

Despite the financial clout of the CDP investors, it is unclear whether CDP disclosure is material. The CDP is somewhat different from typical institutional investor activism. Institutional investor activism often interferes with management decisions with the intention of increasing shareholder value. For example, CalPERS annually announces the so-called focus list, a list of poorly performing firms, aiming to improve their stock performance and corporate governance through active engagement with management. The majority of prior studies find a "CalPERS effect," that is, positive abnormal stock returns of firms included in the focus list around the day of its announcement.[1] Positive shocks suggest that these types of activism create shareholder value. The CDP, however, does not actively interfere with management decisions. Instead, it simply encourages disclosure of environmental performance. A natural question is then exactly what the CDP accomplishes with its monitoring function. Does a firm's CDP participation affect shareholder value?

We empirically examine the circumstances under which participation in the CDP affects shareholder value.[2] For this purpose, we pose a series of empirical research questions. We first explore the broad question of whether firms' CDP participation has a

[1] For a recent example, see Barber (2006).

[2] We ask the question of when, instead of whether, institutional investor activism pays. This is based on our sense that the latter question may be too broad, especially for environmental activism. One of the important questions the empirical literature on corporate environmental strategy seeks to answer is whether going "green" pays or not. There have been numerous studies trying to link firms' environmental and financial performance, but the evidence is mixed (Margolis and Walsh, 2003). Perhaps one of the reasons it is difficult to establish a more definite link is that the question is simply too broad. Instead of asking whether going green pays or not, researchers have begun to ask when going green pays (King and Lenox, 2001). The same point would seem to apply to institutional investor activism.

direct impact on stock prices. Then, we ask two situation-specific questions by making use of Russia's ratification of the Kyoto Protocol on October 22, 2004, which caused the Protocol to go into effect in all the nations that had ratified it. We ask whether upon Russia's ratification, prior CDP participation affected stock prices, either in countries that had already ratified the Protocol or in countries that had not yet ratified it. We hypothesize that CDP participants experienced no abnormal returns in countries that had already ratified the Protocol, because firms in these countries had already taken measures in anticipation of Kyoto. On the other hand, we posit that CDP participation paid in countries that had not yet ratified Kyoto, especially for firms in greenhouse gas emitting industries likely to be affected by future regulations. Our results suggest that Russia's ratification increased the pressure on countries that had not yet ratified Kyoto to take some action on climate change, and accordingly the likelihood of regulatory action on climate change rose in these countries. Under this circumstance, CDP participants were apparently viewed as better prepared for the exogenous shock.

The paper is organized as follows. Section 2 describes the CDP. Section 3 poses research questions and surveys the relevant literature. Section 4 describes methods, and section 5 describes our data. Section 6 reports results and section 7 concludes.

2. The Carbon Disclosure Project

Investors have expressed concerns over the financial risks to which companies might be exposed due to their greenhouse gas emissions.[3] Two types of potential financial risks are present. One is the direct effect of climate change via changes in weather patterns and rising sea levels. The other is the effect of regulation, such as abatement and liability costs. In 2002, institutional investors started to address these concerns collectively via the CDP. Each year, the CDP asks the world's 500 largest companies (the FT Global 500)[4] to disclose their greenhouse gas emissions, risks, opportunities, and management strategies by answering the CDP questionnaire.[5]

[3] See, for example, the Wall Street Journal, "Moving the Market: Investors Urge Large Companies to Disclose Data on Emissions," 02/02/05.

[4] The information requests have historically been sent to the FT Global 500, but in 2006 the CDP expanded and in 2007 the information request was sent to 2,400 companies globally. www.cdproject.net.

[5] The CDP questionnaire itself has evolved since 2002. The CDP4 questionnaire includes the following: 1) *General*: How does climate change represent commercial risks and/or opportunities for your company? 2)

Company responses to the CDP questionnaire are made publicly available on the CDP website. The results from the first cycle of the project (CDP1), which was endorsed by 35 institutional investors with $4.5 trillion in assets, were made available on February 17th 2003. Of the FT Global 500 companies, 71% responded and 45% answered the questionnaire in full. Since then, both the number of institutional investors who endorsed the CDP project and the response rate have steadily increased over time.[6] By the fourth cycle of the project (CDP4), the number of endorsers had increased to 225 institutional investors with more than $31 trillion in assets. The CDP4 results were made available on September 18th 2006. Of the FT Global 500 companies, 91% responded and 72% answered the questionnaire in full.

This paper makes use of companies' responses to the first four cycles of the CDP, CDP1 through CDP4, to investigate under what circumstances firms' participation in CDP, a positive response to environmental activism by institutional investors, increases shareholder value. For our event study analysis, we re-categorize the CDP response categories. The CDP places corporate responses into five categories: Questionnaire Forthcoming (QF), Answered Questionnaire (AQ), Provided Information (IN), Declined to Participate (DP), and No Response (NR).[7] We combine the five categories into two

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Regulation: What are the financial and strategic impacts on your company of existing regulation and proposed future regulation? 3) *Physical risks*: How are your operations affected by extreme weather events, changes in weather patterns, etc.? What actions are you taking to adapt to these risks, and what are the associated financial implications? 4) *Innovation*: What technologies, products, processes or services has your company developed, or is developing, in response to climate change? 5) *Responsibility*: Who at board level has specific responsibility for climate change related issues and who manages your company's climate change strategies? 6) *Emissions*: What is the quantity of annual emissions of the six main GHG's produced by your owned and controlled facilities? 7) *Products and services*: What are your estimated emissions associated with use and disposal of your products and services, and supply chain? 8) *Emissions reduction*: What is your firm's emissions reduction strategy? 9) *Emissions trading*: What is your firm's strategy for, and expected cost/profit from, trading in the EU Emissions Trading Scheme? 10) *Energy costs*: What are the total costs of your energy consumption, e.g. fossil fuels and electric power? Please quantify the potential impact on profitability from changes in energy prices and consumption. http://www.cdproject.net/questionnaire.asp.

[6] The CDP2 request was endorsed by 95 institutional investors with $10 trillion in assets. Of the FT500, 86% responded and 60% answered in full. The results were disclosed on May 19th 2004. The CDP3 request was endorsed by 155 institutional investors with more than $21 trillion in assets; 89% of firms responded and 71% answered in full. The results were disclosed on September 14th 2005.

[7] QF = Questionnaire Forthcoming, which means a company has confirmed that it does intend to answer the CDP questions. AQ = Answered Questionnaire, which means a company has answered the questions as they are set out in the CDP documents. IN = Provided Information, which means a company has responded by providing an Environment / CSR / Annual report or a web link to such a report. It could also be a more detailed email or letter that provides some information but does not actually answer the questions as they are set out in the CDP documents. DP = Declined to Participate, which means a company has responded

categories based on the similarity of responses: CDP participants and CDP non-participants. CDP participants include companies in the QF or AQ categories. CDP non-participants include companies in the DP or NR categories. We do not include the IN category in either of our two categories, because the IN category seems quite distinct either from the CDP participant group or the CDP non-participant group, and because the IN category is so broad as to be difficult to interpret.

3. Research Questions and Literature Review

As we discussed in the Introduction, the CDP does not interfere with management decisions. Instead, it monitors environmental performance and management. We are interested in whether, and when, this type of institutional investor activism affects shareholder value. In this section we pose a series of three research questions, offering a review of the relevant literature after each one. We begin with:

Question 1: Does corporate participation in the CDP affect stock prices?

From a theoretical perspective, Verrecchia (1983) and others have shown that a manager only discloses information voluntarily when the firm has "good news," that is, when it performs better than market expectations. In a broader theory of corporate governance, Tirole (2001) shows how passive monitoring of firm performance, i.e., monitoring without interfering with management, might increase the rate of return for investors. The basic idea is that stock prices are affected by various events beyond a manager's control, so there may exist a signal that provides more accurate information about managerial performance than does the firm's stock price. Acquiring the signal allows investors to increase the pledgeable income from the firm, that is, the residual available to investors after the manager's incentive compatibility constraint has been satisfied. Together, these papers suggest that firms' CDP participation is good news and may positively affect their stock prices around the date of CDP disclosure.

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saying that they will not be answering the CDP questions. NR = No Response, which means a company has not responded at all. http://www.cdproject.net/faq.asp.

Applying the theoretical literature to the case of the CDP is not straightforward, however, since firms' CDP participation presents a somewhat special setting that limits the applicability of the predictions of the foregoing papers. First of all, firms' CDP participation may not be entirely discretionary, whereas Verrecchia (1983) focuses on purely discretionary disclosure. Considering the large stakes of the institutional investors in these companies, the CDP request may be seen as a threat by some companies, making it hard to argue that a firm's decision to participate in the CDP is purely discretionary. Furthermore, to the extent that the disclosed information is not proprietary (Verrecchia, 1983), firms with good news should have already disclosed their information without being asked. Second, while in Tirole (2001) passive monitoring more accurately reveals managerial behavior, i.e., whether the manager is pursuing private benefits or investor benefits,[8] the CDP may not be so informative. In particular, the link between a firm's CDP participation status and the manager's private benefits is simply not clear. This in turn makes it difficult, from a theoretical perspective, to establish a clear link between a firm's CDP participation status and its financial performance.

On the empirical side, two strands of research are relevant. One examines the relation between environmental information disclosure and environmental performance, while the second studies the relation between environmental performance and financial performance. There is mixed evidence on both. Regarding the link between disclosure and environmental performance, Patten (2002) finds a negative association between the

[8] In Tirole (2001) interim performance revealed by passive monitoring informationally dominates the final outcome. This means that when a signal changes from good to bad, the percentage decrease in probability of project success is higher in terms of interim signals than in terms of initial probabilities, i.e., $\frac{q_H - q_L}{q_H} > \frac{p_H - p_L}{p_H}$, where p_H = Initial probability of project success with no shirking, p_L = Initial probability of project success with shirking, q_H = Good interim signal with no shirking ($q_H > p_H$), and q_L = Bad interim signal with shirking ($q_L < p_L$). Under passive monitoring, the manager's incentive compatibility constraint is $(q_H - q_L)w \geq B$, where w is managerial compensation in case of success, and B is the manager's private benefit in case of shirking. Return to investors is then $p_H R - \frac{q_H}{q_H - q_L} B - C_p$, where R is project income in case of success (zero otherwise) and C_p is the cost of passive monitoring. Return to investors is higher with passive monitoring as long as C_p is sufficiently small, i.e., $C_p < \left(\frac{p_H}{p_H - p_L} - \frac{q_H}{q_H - q_L} \right) B$. In sum, passive monitoring works to lower the incentive constraint of the manager, increasing return to investors. This leads to a lower cost of capital.

extent of discretionary disclosures and environmental performance, and argues that the mixed results of earlier studies may have to do with omitted variable and sample selection biases. In contrast, Clarkson, et al. (2008) find a positive association between disclosures and environmental performance, and argue that earlier studies were not careful enough in restricting themselves to purely voluntary disclosures. Regarding the link between corporate environmental and financial performance, Margolis and Walsh (2003) review numerous studies that examine the link between these two variables, with the majority of studies finding positive associations. However, the direction of causality is unclear: better environmental performance may increase investor returns, or better financial performance may create enough managerial slack to allow managers to indulge their personal environmental preferences at the expense of shareholders. Margolis and Walsh do not distinguish between studies focusing on voluntary disclosure and studies focusing on voluntary overcompliance. In the context of environmental information disclosure, previous studies have consistently found that at times of regulatory threat the market rewards greater prior environmental information disclosure (Bowen, Castanias, and Daley, 1983; Hill and Schneeweis, 1983; Blacconiere & Patten, 1994; Blacconiere & Northcut, 1997; Patten & Nance, 1998). Whether greater disclosure increased shareholder value in the case of the CDP is our first empirical question.

Next, we ask two situation-specific questions by making use of an exogenous event, Russia's ratification of the Kyoto Protocol on October 22, 2004. We expect Russia's ratification to have had significant effects on the likelihood of climate change regulation. For the Protocol to go into force in all the nations that had ratified it, the Protocol needed to be ratified by at least 55 countries that accounted for at least 55% of global GHG emissions. The threshold was met when Russia ratified the Protocol on October 22, 2004. Thus, we ask whether upon Russia's ratification, CDP participation affected stock prices, either (a) in countries that had already ratified the Protocol or (b) in countries that had not yet ratified it.

Question 2: Upon Russia's ratification of the Kyoto Protocol, did firms' CDP participation affect stock prices in countries that had already ratified the Protocol?

Previous literature on the effects of international institutions discusses how international institutions can affect domestic policy through various channels even without legal obligations (Keohane, et al., 1993; Cortell and Davis, 1996; Bernstein, 2002; Martin and Simmons, 2005; Simmons and Hopkins, 2005). This literature suggests that the Kyoto Protocol, an international environmental institution, is likely to have exerted pressure on national governments and other actors before Russia's ratification of the Protocol. For example, Bernstein (2002) and Simmons and Hopkins (2005) specifically discuss how signing an international treaty might affect national policy even before the treaty goes into effect. This indicates that an individual nation's decision to ratify the Kyoto Protocol is likely to have exerted pressure on other aspects of domestic policy.

This indeed seems to be the case. For instance, the European Union (EU) implemented the European Union Emission Trading Scheme (EU ETS) to comply with the Kyoto Protocol.[9] Although the EU ETS officially started operation in January 2005, it was designed well before Russia's ratification on October 22, 2004. The EU ETS is based on Directive 2003/87/EC, which entered into force in 2003.[10] This was after the EU ratified the Kyoto Protocol in May 2002. Also, the second phase of the EU ETS, 2008-2012, exactly coincides with the Kyoto target period. It seems clear that once the EU ratified Kyoto, the EU ETS was designed in anticipation of Kyoto becoming binding. The EU's preparation for Kyoto is likely to have been facilitated by the specific reduction targets stipulated in the Kyoto Protocol for developed countries. The EU is expected to reduce emissions 8% below the 1990 level during 2008-2012 and has reached agreement on how its targets are to be allocated amongst its members.[11] This in turn implies that the EU member countries had prepared themselves in anticipation of Kyoto well before Russia's ratification of Kyoto. Furthermore, Bernstein (2002) provides an interesting case study of how the Kyoto Protocol shaped the domestic climate change policy of Kyoto signatory Canada before Russia's ratification.

[9] www.environment-agency.gov.uk.
[10] http://ec.europa.eu/environment/climat/emission.htm.
[11] http://unfccc.int/kyoto_protocol/background/items/3145.php

The literature surveyed above suggests that upon Russia's ratification of the Kyoto Protocol, firms' participation in the CDP likely had little measurable impact if the firms were in countries that had already ratified Kyoto, because in these countries firms presumably had already taken measures in anticipation of Kyoto. In these countries, we might expect that future regulatory costs changed upon their own ratification of the treaty, not upon Russia's ratification of the Kyoto Protocol.

Question 3: Upon Russia's ratification of the Kyoto Protocol, did firms' CDP participation affect stock prices in countries that had not yet ratified it, especially if firms were in greenhouse gas intensive industries?

Keohane, et al. (1993), Bernstein (2002) and Martin and Simmons (2005) explain how international institutions embody international norms and thus exert pressure on recalcitrant nations. Their arguments suggest that the official international adoption of the Kyoto Protocol upon Russia's ratification is likely to have exerted pressure on countries that had not yet ratified it, such as the US or Australia. Indeed, the Wall Street Journal described how Russia's ratification increased the regulatory pressure in the US.[12] We expect this was especially so for firms in GHG intensive industries such as energy, ferrous metals, mineral, and pulp and paper.[13] For these firms, it seems plausible that Russia's ratification increased the probability of domestic regulatory action of climate change.

We argue that for firms in non-signatory nations, the increased likelihood of climate regulation following Russia's ratification should have affected the shareholder value of CDP participants differently from non-participants. Prior empirical studies on the effect of environmental information disclosure consistently find that at times of regulatory threat, environmental disclosure paid off. Blacconiere & Patten (1994) find that chemical firms with more extensive environmental disclosures in their financial report prior to Union Carbide's 1984 chemical leak in Bhopal, India, experienced a less negative stock market reaction than firms with less extensive prior disclosures.

[12] The Wall Street Journal, "As Kyoto Protocol Comes Alive, So Do Pollution-Permit Markets --- Funds Handling Trades For Emissions Credits Gain While Russia Sets Pact," 11/08/04.
[13] Refer to footnotes in Table 2 for complete list of industries included in our sample.

Blacconiere & Northcut (1997) find that chemical firms with more extensive environmental disclosures had a less negative share price reaction after the Superfund Amendments and Reauthorization Act of 1986. Patten & Nance (1998) find that petroleum firms with less extensive environmental disclosures faced more negative stock price reactions in the wake of the Exxon Valdez oil spill.[14] Freedman and Patten (2004) find that toxic emitters with less extensive environmental disclosures suffered more negative reactions upon the unexpected proposal by President Bush in 1989 for revisions to the Clean Air Act.

Why does a greater likelihood of regulation increase the value of environmental information disclosure? Rationality-based stock valuation models suggest that a firm's stock price is the present value of expected cash flows, discounted at the appropriate rate of return. A regulatory threat has a potentially negative influence on a firm's expected cash flows because it may increase expected future regulatory costs; firms may have to incur higher compliance costs, penalties, or liability costs (Bowen et al., 1983; Hill and Schneeweis, 1983; Blacconiere & Patten, 1994; Freedman and Patten, 2004). A decrease in a firm's expected future cash flows lowers the firm's stock price. The empirical evidence suggests that investors viewed firms with more extensive prior disclosures as better prepared for possible future environmental regulations.

The foregoing lines of research suggest that upon Russia's Kyoto ratification, firms' CDP participation may have positively affected stock prices for firms in countries that had not yet ratified Kyoto, especially for firms in greenhouse gas intensive industries.

4. Method

We employ the event study methodology that focuses on mean stock price effects to test our hypotheses.[15] The basic idea is that given rationality in the market place, the effects of an event will be immediately reflected in security prices (MacKinlay, 1997). Thus, we can measure the effect of an event on the value of a firm by observing security

[14] The oil spill triggered substantial increase in gasoline prices. The unexpected price increase was interpreted as good news for petroleum companies leading to positive abnormal returns (Pattern and Nance, 1998).
[15] For overviews of this method, see MacKinlay (1997) and Kothari and Warner (2004).

prices over a short period. We use the market model[16], which assumes joint normality of security returns, and posits:[17]

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (1)$$

where R_{it} = return on security i on day t
R_{mt} = return on market portfolio on day t
$\mathrm{E}(\varepsilon_{it}) = 0, \mathrm{Var}(\varepsilon_{it}) = \sigma^2_{\varepsilon_i}$

From equation (1), the market model parameters, $\alpha_i, \beta_i,$ and $\sigma^2_{\varepsilon_i}$ are first estimated using data from the period preceding the event (the estimation window) and thus not affected by the event. The market model parameters are then used to calculate abnormal returns during an event window. As shown in equation (2) the abnormal return is calculated by subtracting the normal return from the actual *ex post* return of the security during the event window.

$$AR_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt}) \quad (2)$$

where AR_{it} = abnormal return on security i on day t

Our estimation window is 250 trading days starting from the sixth day prior to the event. We choose the large estimation window size to minimize out-of-sample bias. Out-of-sample bias can arise since the event study methodology applies the estimated results from estimation window to event window. The abnormal returns are essentially calculated on an out-of-sample basis. Thus, any difference between in-sample and out-of-

[16] The market model differs from the Capital Asset Pricing Model (CAPM), which is based on an equilibrium theory where the expected return of a given asset is determined by its covariance with the market portfolio ($R_{it} - R_{ft} = \alpha_i + \beta_i (R_{mt} - R_{ft}) + \varepsilon_{it}$, where R_{ft} is the risk-free rate, and α_i is expected to be zero). The use of the CAPM is common in event studies of the 1970s. However, deviations from the CAPM have been discovered, implying that the validity of the restrictions imposed by the CAPM is questionable. Because this potential can be avoided at little cost by using the market model, the use of the CAPM has almost ceased (MacKinlay, 1997).

[17] The market model also assumes that $\mathrm{Cov}(R_{mt}, \varepsilon_{it}) = 0$. Other variables may be associated with security returns, especially firm size and book-to-market equity (Fama and French, 1992; 1996). For short-horizon event studies using daily data, however, the effect of these variables is not significant (Bernard, 1987; Kothari and Warner, 2004). Our use of the market model also reflects limited data availability for international firms.

sample periods should be taken into account (Collins and Dent, 1984). With the large estimation window, however, the increase in variance over the event window due to the sampling error in α_i and β_i becomes negligible as the sampling error of the parameters vanishes (MacKinlay, 1997). Under this circumstance, the variance of the abnormal returns over the event window can be approximated by the variance of the error term in equation (4), i.e., $\text{Var}(AR_{it}) \approx \sigma_{\varepsilon_i}^2$ (MacKinlay, 1997).

To examine the effect of an event, the abnormal return for each period should be aggregated over multiple periods and over multiple securities. We use multiple event windows, which include both pre-event and post-event periods. This is to allow for the possibility of information leakage during pre-event periods and for adjustment periods following the event. Given *N* securities, the mean cumulative abnormal returns for period *T* can be calculated as shown in (3). Assuming no serial correlation and independence across securities, the corresponding variance can be represented by equation (4).[18] The standard hypothesis of event studies is that the event has no impact, i.e., the mean cumulative abnormal returns are not significantly different from zero, which can then be tested under the normality assumption.

$$\overline{CAR(t_1,\cdots,t_T)} = \frac{1}{N}\sum_{i=1}^{N}\sum_{t=1}^{T} AR_{it} \tag{3}$$

$$\text{Var}\left(\overline{CAR(t_1,\cdots,t_T)}\right) = \frac{1}{N^2}\sum_{i=1}^{N}\text{Var}\left(\overline{CAR_i(t_1,\cdots,t_T)}\right) \tag{4}$$

where $\text{Var}\left(\overline{CAR_i(t_1,\cdots,t_T)}\right) = (t_T - t_1 + 1)\sigma_{\varepsilon_i}^2$

Variance estimation as shown in equation (4) is based on three assumptions: 1) changes in variance during the estimation and the event windows are not significant, 2) abnormal returns are not serially correlated, and 3) abnormal returns are not cross-sectionally correlated. Deviations from these assumptions, however, should be taken into account (Patell, 1976; Collins and Dent, 1984; Bernard, 1987). To address these concerns, we use several statistics to test the standard hypothesis of event studies that the event has

[18] Equation (4) follows from the fact that with our large estimation window, $\text{Var}(AR_{it}) \approx \sigma_{\varepsilon_i}^2$.

no impact. To control for changes in variance over time and serial correlation, we use the serial correlation adjusted Patell test and the standardized cross-sectional test. Both tests involve standardizing abnormal returns using a measure of standard deviation during the event window period (Cowan, 2006). Both tests also control for the fact that because abnormal returns during the event window are all functions of the same market model parameters, the abnormal returns during the event window are serially correlated (MacKinlay, 1997). In addition, we use the Jackknife test, which also controls for changes in variance over time using standardized abnormal returns (Cowan, 2006).[19]

To demonstrate that an event has a significant impact, event studies typically show that the mean cumulative abnormal returns change patterns before and after the event date, i.e., not significantly different from zero before the event date and significantly different from zero in one direction for a sustained period after the event date (Khanna, et al., 1998; Konar and Cohen, 1995; Hamilton, 1993).

5. Data

We obtained the CDP response data from Innovest, a company specializing in identifying non-traditional sources of risk and value potential for investors. The data includes the FT Global 500 companies in 2006, the year for their CDP4 response. The data also includes the company responses to the CDP1, CDP2 and CDP3 requests. Table 1 shows the number of companies in each response category in our sample.

As described in section 2, for our analysis we aggregate the CDP responses into two categories: CDP participants and CDP non-participants. CDP participants include companies in the QF or AQ categories. CDP non-participants include companies in the DP or NR categories. We do not include the IN category in either of our two categories because the IN category seems quite distinct either from the CDP participant or the CDP non-participant group and is broad and vague.

[19] Collins and Dent (1984) examine the severity of cross-sectional correlations when there is industry concentration in sample firms. Our sample, FT500, covers 27 countries and diversified industries ranging from aerospace & defense to banks and movies & entertainment. Industry concentration in our sample is expected to be less problematic. Also, Bernard (1987) points out that the degree of cross-sectional correlation increases dramatically as the event window increases from daily periods to annual periods. Our event study uses daily periods, which reduces these concerns.

To construct our global benchmark, we use the Morgan Stanley Capital Investments (MSCI) database.[20] We obtain the firm-specific daily return index and other firm-specific variables from Thomson Datastream.[21] Table 2 reports summary statistics for our sample, both in the aggregate and by Kyoto ratification status, i.e., whether the firm is headquartered in a country that had ratified the Kyoto Protocol when Russia ratified on Oct 22, 2004. Firm size is represented by market capitalization. Growth prospects are represented by price-to-book-value ratio and price-to-earnings ratio. Although the mean market capitalization and price-to-book value ratio are somewhat different between firms in countries that had ratified Kyoto and firms in countries that had not yet ratified it, the effect of these variables on the estimates of abnormal returns is not significant for short-horizon event studies using daily data (Bernard, 1987; Kothari and Warner, 2004). MacKinlay (1997) also points out that for event studies the additional variables other than the market factor add relatively little explanatory power. In addition, since small cap and value (low growth prospects) stocks tend to outperform the market (Fama and French, 1992) and the mean market capitalization is smaller for firms in countries that had ratified Kyoto and the mean price to book value ratio is lower for firms in countries that had not ratified it, their effects on abnormal returns, if any, are in the opposite direction, counteracting each other's effects.

6. Results

The analysis results are presented in Tables 3 through 5. Table 3 shows results for the effects of CDP participation across the first four cycles of the project. Tables 4 and 5 show results for the effects of Russia's Kyoto ratification for firms in countries that had

[20] Used with permission of Wharton Research Data Services (WRDS). The MSCI total return index values are used. Global benchmark returns on day t are set equal to (RI_t/RI_{t-1})-1, where RI_t is the return index on day t.

[21] Used with permission of Datastream. Using the firm-specific daily return index, we construct the firm-specific daily return values as follows, where ex-date refers to the first day of the ex-dividend period (the period of time between the announcement of the dividend and the payment).

If $t \neq$ ex-date of the dividend payment D_t, $R_t = \frac{P_t}{P_{t-1}} - 1$, where P_t = adjusted closing price on date t, where P_{t-1} = adjusted closing price on previous day, and D_t = dividend payment associated with ex-date t.

If t = ex-date of the dividend payment D_t, $R_t = \frac{P_t + D_t}{P_{t-1}} - 1$, where P_t = adjusted closing price on ex-date.

already ratified the Kyoto Protocol and for firms in countries that had not yet ratified it, respectively.

The effects of disclosure of firms' CDP participation status

The effects of each CDP disclosure are shown in Table 3 for all firms in our sample. As discussed in section 4, to demonstrate that an event has a significant impact, event studies typically look for whether the mean cumulative abnormal returns change patterns before and after the event date, i.e., not significantly different from zero before the event date and significantly different from zero in one direction for a sustained period after the event date (Khanna, et al., 1998; Konar and Cohen, 1995; Hamilton, 1993).

Based on the foregoing criterion, CDP2 non-participants appear to have experienced a negative shock upon CDP2 disclosure, since their abnormal returns were positive and significant the day before disclosure and consistently negative and significant after disclosure. Similarly, CDP3 participants appear to have experienced a positive shock upon CDP3 disclosure, since their abnormal returns were negative and significant the day before disclosure and positive and significant (except for day 0, which was not significant) after disclosure. We do not find consistent effects for CDP1 and CDP4 disclosure, however. Overall, although we find some evidence that CDP participants experienced more positive outcomes than non-participants, we find it difficult to assert with confidence that there are systematic effects of CDP disclosure.[22]

The effect of Russia's ratification of the Kyoto Protocol

The effects of Russia's ratification of Kyoto on stock prices are examined in Tables 4 and 5. The effects on firms in countries that had already ratified Kyoto on the date of Russia's ratification are presented in Table 4, and the effects on firms in countries that had not ratified Kyoto are presented in Table 5. Results are disaggregated by

[22] We also examine whether dropping out of CDP had any effects on firm stock prices. The results are mixed. There were 10 firms that participated in CDP2 but did not participate in CDP3 and 6 firms that participated in CDP3 but not in CDP4. We examine whether their stock prices were negatively affected upon CDP3 disclosure and upon CDP4 disclosure, respectively. We find that only dropping out of CDP3 had some negative effects, although significance is mostly limited to dates prior to CDP3 disclosure.

whether or not a firm is in a greenhouse-gas intensive industry, and, alternatively, whether or not it is in the energy industry.[23]

Turn first to firms in countries that had ratified Kyoto before the date of Russia's ratification. For firms in GHG-intensive industries or in the energy industry, there are clearly no significant and sustained abnormal returns. However, Table 4 appears to show significant effects for CDP2 participants that are not in GHG emitting or energy industries, with a positive abnormal return on date zero but negative abnormal returns for the windows (0,1) and (0,2). Nevertheless, to us, this jump from a positive initial effect to a negative effect in subsequent days does not qualify as a significant and sustained effect. For example, it may be that additional shocks at dates 1 and 2 affected firms in these groups. Overall, then, we find it difficult to argue there were significant and sustained effects of firms' CDP participation on stock prices in countries that had already ratified Kyoto. This is consistent with our prior that for firms in these countries, the expected regulatory response to climate change did not particularly change upon Russia's ratification, presumably because they had already prepared themselves in anticipation of Kyoto.

The effects of firms' CDP participation in countries that had not yet ratified the Kyoto Protocol as of Russia's ratification are presented in Table 5. The table shows a somewhat chaotic pattern of abnormal returns for firms that were not in GHG emitting or energy industries, both for CDP participants and non-participants.[24] In both groups, there is an initial significant and negative effect on day 0, which becomes insignificant or even positive by day 2. For firms in GHG emitting industries or in energy industries, however, the effects of CDP participation are consistently positive and significant. Firms in these industries that did not participate in the CDP experienced abnormal returns that were not significantly different from zero. The impact of the CDP in this setting is our main finding. Upon Russia's Kyoto ratification, firms' participation in the CDP increased

[23] GHG industry indicates whether a firm is in the GHG emitting industries, especially those covered by the EU ETS. The Yes category includes companies in energy, production and processing of ferrous metals, mineral, and pulp and paper industries. The No category includes all other industries. Energy Industry includes electric utilities, oil refineries and coke ovens. *Application of the emissions trading directive by EU Member States*, European Environmental Agency (2006), p.43.

[24] Although not a subject in this paper, it would be interesting to study why Russia's Kyoto ratification had significant negative effects for firms not in GHG emitting or energy industries in countries that had not yet ratified Kyoto on the date of Russia's ratification.

stock prices in a significant and sustained fashion if the firms were in GHG emitting industries that were expected to be regulated and in countries that had not yet ratified the Kyoto Protocol. This suggests that for these firms, Russia's official ratification of the Kyoto Protocol signaled a shift in the likelihood of future climate change regulation. Under this circumstance, CDP participants appeared to be viewed as better prepared for the exogenous change.

Valuation of the effect of Russia's Ratification

We estimated the total value created by institutional investor activism for our main finding, namely the increase in shareholder value upon Russia's Ratification for CDP participants in GHG emitting industries located in countries that had not ratified Kyoto. To obtain the most conservative estimate, we focus on the smallest significant abnormal return on Oct 22, 2004 among alternative approaches and only use the day 0 excess return. The total value created is about $2.7 billion (= 0.0037 (the smallest significant abnormal return on Oct 22, 2004) × $43705.49 million (the mean market cap for our sample firms in countries that had not ratified Kyoto) × 17 (the number of firms in GHG emitting industries located in countries that had not ratified Kyoto)).[25] This is about 27% of the size of the carbon market in 2005.[26]

7. Conclusion

In this paper, we study when institutional investor activism towards climate change pays by making use of data from the Carbon Disclosure Project. To our knowledge, this is the first paper to examine empirically the effect of institutional investor activism on climate change issues.

Using the event study methodology, we examine when it paid for firms to participate in the CDP. We find no systematic evidence of increased value around the dates each year that participation was announced. However, we do find that CDP participants were treated better by investors when exogenous events caused the likelihood of climate change regulation to rise. We identify this effect using Russia's ratification of

[25] The numbers are taken from Table 2 and Table 5.
[26] *State and Trends of the Carbon Market 2006*, The World Bank, 2006.

the Kyoto Protocol on October 22, 2004, which caused the Protocol to go into effect in all the nations that had ratified it. We argue that Russia's ratification increased the pressure on countries that had not yet ratified Kyoto to take some action on climate change, and accordingly firms in countries such as the U.S. saw the probability of a regulatory response to climate change rise. We find that in countries that had already ratified Kyoto, CDP participants did not experience systematic abnormal returns upon Russia's ratification, presumably because firms in these countries had already taken measures in anticipation of Kyoto. In nations that had not ratified the Protocol, however, most notably the U.S., we find that firms experienced positive and significant abnormal returns on the day of Russia's ratification. We conservatively estimate the total value created at $2.7 billion, about 27% of the size of the carbon market in 2005.

Our findings demonstrate that institutional investor activism toward climate change pays when the external business environment becomes more climate conscious. This effect is particularly notable since the activism we study was passive in nature and did not involve any interference in managerial decisions. More broadly, we conclude that institutional investor activism towards issues seemingly unrelated to shareholder value can indeed be value-increasing under certain circumstances.

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Table 1. Number of Companies in the CDP Response Categories in our Sample*

	CDP1	CDP2	CDP3	CDP4
QF	0	17	0	27
AQ	185	244	319	345
DP	62	54	41	43
NR	83	48	44	40
IN	32	23	34	44
NA**	137	114	62	1

* We obtained the CDP response data from Innovest, a company specializing in identifying non-traditional sources of risk and value potential for investors. The data includes the FT Global 500 companies in 2006, the year for their CDP4 response.

** NA: Not in FT Global 500 or Not Available.

QF = Questionnaire Forthcoming, this means a company has confirmed that it does intend to answer the CDP questions. AQ = Answered Questionnaire, this means a company has answered the questions as they are set out in the CDP documents. IN = Provided Information, this means a company has responded by providing an Environment / CSR / Annual report or a web link to such a report. It could also be a more detailed email or letter that provides some information but does not actually answer the questions as they are set out in the CDP documents. DP = Declined to Participate, this means a company has responded saying that they will not be answering the CDP questions. NR = No Response, this means a company has not responded at all. http://www.cdproject.net/faq.asp.

Table 2. Firm Characteristics in Aggregate and by Kyoto Ratification Status, 2004*

	CDP2 sample	Firms in countries that had ratified Kyoto as of Oct 22, 2004	Firms in countries that had not ratified Kyoto as of Oct 22, 2004
Number of firms**	358	183	175
Mean Market capitalization***	37969.01M USD	32232.52M USD	43705.49M USD
Mean Price to book value***	3.23	3.61	2.86
Mean Price to Earnings***	31.96	30.98	32.99
GHG Industry****	Yes – 60 No – 298	Yes – 37 No – 146	Yes – 23 No – 152
Countries represented	Australia – 5 Belgium – 4 Brazil – 2 Canada – 16 Denmark – 3 Finland – 1 France – 21 Germany – 13 Hong Kong – 8 India – 2 Ireland – 3 Italy – 9 Japan – 35 Mexico – 2 Netherlands – 8 Norway – 2 Russia – 3 Saudi Arabia – 5 Singapore – 2 South Africa – 1 South Korea – 2 Spain – 8 Sweden – 6 Switzerland – 7 Taiwan – 2 UK – 27 US – 161	Belgium – 4 Brazil – 2 Canada – 16 Denmark – 3 Finland – 1 France – 21 Germany – 13 Hong Kong – 8 India – 2 Ireland – 3 Italy – 9 Japan – 35 Mexico – 2 Netherlands – 8 Norway – 2 Russia – 3 South Africa – 1 South Korea – 2 Spain – 8 Sweden – 6 Switzerland – 7 UK – 27	Australia – 5 Saudi Arabia – 5 Singapore – 2 Taiwan – 2 US – 161

* Kyoto ratification status indicates whether the country had already ratified the Kyoto Protocol when Russia ratified Kyoto on Oct 22, 2004.
** Five firms are dropped because their firm-specific returns are not available.
*** The average values are calculated based on the data available from Datastream.
**** GHG industry indicates whether a firm is in the GHG emitting industries, especially those covered by the EU ETS. The Yes category includes companies in energy, production and processing of ferrous metals, mineral, and pulp and paper industries. The No category includes all other industries. *Application of the emissions trading directive by EU Member States*, European Environmental Agency (2006), p.43.
Note that our sample covers diverse industries including Advertising, Aerospace & Defense, Air Freight & Couriers, Automobiles, Banks, Biotechnology, Broadcasting & Cable TV, Computers & Peripherals, Diversified Financials, Electric Power Companies, Food Products, Health Care Providers & Services, Hotels, Restaurants & Leisure, Insurance, Integrated Oil & Gas, Internet Software & Services, Metals & Mining, Movies & Entertainment, Paper & Forest Products, Pharmaceuticals, Publishing, Real Estate Management & Development, Semiconductor Equipment & Products, Steel, Surface Transport, Textiles, Apparel & Luxury Goods, Wireless Telecommunication Services.

Table 3. The Effects of CDP Disclosure – all firms

	CDP1		CDP2		CDP3		CDP4	
CDP participation	Yes	No	Yes	No	Yes	No	Yes	No
No of firms	178	143	256	96	312	74	357	67
Event window	Mean Cumulative Abnormal Return (%)							
-1	0.52**	0.71***	0.20	0.60**	-0.17**	-0.45**	0.13*	0.15
0	0.60***	0.30	0.50***	-0.26***	0.03	-0.38*(a)	0.04	0.14
(0,1)	0.38	0.38	0.14	-0.24$	0.19*	0.03	-0.35***	-0.11
(0,2)	-0.40	-0.26	0.11	-0.25$	0.54***	0.41	-0.33	-0.41

The symbols $,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively, using a 2-tail Patell Z test.
(a) Statistically significant at the 0.01 level using a 2-tail Cross-sectional standard deviation test and a 2-tail Jackknife test.

Table 4. The Effects of Russia's Kyoto Ratification in countries that had ratified Kyoto

	CDP2		CDP2		CDP2		CDP2	
No of firms	183				183			
GHG Industry[1]	Yes		No					
Energy Activities Industry[2]					Yes		No	
CDP participation	Yes	No	Yes	No	Yes	No	Yes	No
No of firms	31	6	127	19	27	6	131	19
Event window	Mean Cumulative Abnormal Return (%)							
-1	0.37	0.49	-0.13	-0.46	0.36	-0.58	-0.11	-0.13
0	0.58*(a)	0.30	0.40***(a)	0.67$(b)	0.46*(a)	0.51	0.43***(a)	0.61$(b)
(0,1)	0.23	-0.34	-0.38*(b)	-0.07	0.04	0.46	-0.32*(b)	-0.32
(0,2)	-0.44	0.73	-0.74***(a)	-0.25	-0.73*	1.19	-0.67***(a)	-0.39

[1] GHG industry indicates whether a firm is in the GHG emitting industries, especially those covered by the EU ETS. The Yes category includes companies in energy, production and processing of ferrous metals, mineral, and pulp and paper industries. The No category includes all other industries. *Application of the emissions trading directive by EU Member States*, European Environmental Agency (2006), p.43.
[2] Energy Industry includes electric utilities, oil refineries and coke ovens. *Application of the emissions trading directive by EU Member States*, European Environmental Agency (2006), p.43.
The symbols $,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively, using a 2-tail Patell Z test.
(a) Statistically significant at the 0.001 level using a 2-tail Cross-sectional standard deviation test and a 2-tail Jackknife test.
(b) Statistically significant at the 0.01 level using a 2-tail Cross-sectional standard deviation test and statistically significant at the 0.001 level using a 2-tail Jackknife test.

Table 5. The Effects of Russia's Kyoto Ratification in countries that had not ratified Kyoto

	CDP2		CDP2		CDP2		CDP2	
No of firms	169				169			
GHG Industry[1]	Yes		No					
Energy Activities Industry[2]					Yes		No	
CDP participation	Yes	No	Yes	No	Yes	No	Yes	No
No of firms	17	5	81	66	13	4	85	67
Event window	Mean Cumulative Abnormal Return (%)							
-1	0.18	-0.58	0.13	-0.28*	-0.02	-0.68$	0.17	-0.28*
0	0.37$	0.47	-0.78***(a)	-0.66***(c)	0.59*(b)	0.61	-0.76***(a)	-0.65***(c)
(0,1)	0.91**(b)	0.63	-1.31***(a)	-1.03***(c)	1.13***(b)	0.09	-1.24***(a)	-0.97***(c)
(0,2)	1.76***(a)	0.62	-0.39	0.42**	2.09***(a)	0.28	-0.33	0.45**

[1] GHG industry indicates whether a firm is in the GHG emitting industries, especially those covered by the EU ETS. The Yes category includes companies in energy, production and processing of ferrous metals, mineral, and pulp and paper industries. The No category includes all other industries. *Application of the emissions trading directive by EU Member States*, European Environmental Agency (2006), p.43.
[2] Energy Industry includes electric utilities, oil refineries and coke ovens. *Application of the emissions trading directive by EU Member States*, European Environmental Agency (2006), p.43.
The symbols $,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively, using a 2-tail Patell Z test.
(a) Statistically significant at the 0.001 level using a 2-tail Cross-sectional standard deviation test and a 2-tail Jackknife test.
(b) Statistically significant at the 0.01 level using a 2-tail Cross-sectional standard deviation test and a 2-tail Jackknife test.
(c) Statistically significant at the 0.01 level using a 2-tail cross-sectional standard deviation test and statistically significant at the 0.001 level using a 2-tail Jackknife test.